PLANNING FOR NAVAL RESEARCH, DEVELOPMENT, TEST AND EVALUATION

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PREFACE

Research, Development, Test, and Evaluation (RDT&E) in the Navy today is truly big business. More than $1.4 billion will be spent for this purpose alone during the current fiscal year, and undoubtedly this figure will rise in the future. As with most endeavors, but especially those which involve large and complex organizations, the usability, feasibility, and applicability of the end products, as well as the efficiency with which they are produced, can be no better than the plans on which they are based. It is with this thought in mind that this thesis has been directed toward an examination of the planning processes by which the Navy prepares to direct its massive RDT&E effort.

However, one word of caution must be expressed for future readers. A special study of the possible reorganization of the Department of the Navy structure, called the Dillon Report, is now before Congress. It is quite possible that this report, if approved and implemented, will drastically alter the organizational structure now utilized in the planning and control of the RDT&E effort. The possibility is very real that the

functional role of the Office of the Chief of Naval Operations (Development) in the administration, planning and control of the RDT&E effort of the Navy may be drastically revised, and that the planning processes now utilized to control the RDT&E effort may be altered considerably in the future.

Special acknowledgment is given to the members of the Office of the Chief of Naval Operations (Development), for without their outstanding cooperation this thesis would never have come into being. Captain Thompson and Lieutenant Commander Lautermilch have been especially helpful in giving up many hours of their valuable time to help explain the inner workings of the processes described.

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INTRODUCTION

In any discussion of the methods and procedures utilized in planning and controlling the efforts of an organization, a major area of concern is that of the structure of the organization itself. In any organization planning must be accomplished at many levels to be effective; Research, Development, Test and Evaluation (RDT&E) is no exception. Overall objectives must be set by the top policy making groups of the organization, requirements must be developed so that plans of lesser scope can be prepared to implement these objectives, and detailed plans must be prepared so that the actual results of applied effort can be compared to the plan. Chapter I is devoted to an examination of the organizational relationships between the major levels of RDT&E management as they currently exist within the Department of the Navy. Particular attention is directed to an examination of the functions of the Office of the Chief of Naval Operations (Development), and its organizational relationships with the Assistant Secretary of the Navy for Research and Development, the other offices of the Chief of Naval Operations, the Chief

of Naval Research, and the various technical bureaus and offices.

As is frequently the case with individual professions or occupations, the naval effort in the RDT&E field has become surrounded and enmeshed in a language of its own. So confusing has this language become that many members of the Navy are unable to communicate effectively among themselves on RDT&E matters. One's imagination does not have to wander far to realize that such a situation creates innumerable problems in meanings and interpretation between members of the Navy's RDT&E effort and representatives from industry.[1]

It should be noted that much of the confusion arising from the diverse terminology employed is a result of the needs of the various agencies and bureaus to develop terminology to satisfy their particular needs and requirements. The creation of the Office of the Chief of Naval Operations (Development) in 1958, and the more recent strengthening of the Department of Defense under Secretary of Defense Robert S. McNamara, have tended to correlate and codify this terminology so that improved communications can assist in improved planning and control.

Although confusing, the terminology employed in the RDT&E field incorporates terms used in the major documents

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[1]Personal interview with Captain J. W. Thomson, USN, Head of the Development Objectives Section of the Office of the Chief of Naval Operations (Development), April 8, 1963.

utilized by the Navy to plan for, and control, the RDT&E effort. In any large organization, objectives, requirements, and plans must be documented to be effective. The documents themselves frequently are in the form of plans, or serve various levels of management as plans. Therefore, Chapter II is devoted to an examination of the major documentation utilized within the Navy to formulate and prescribe research and development plans. An understanding of the documents themselves is necessary in order to understand how they are utilized in the overall planning process.

The functional operation of the planning process is examined in Chapter III. As mentioned above, planning must be conducted at all levels of an organization to be effective. However, for the purpose of this thesis, the planning processes to be examined are those which lead up to, but do not include, the actual execution of a project. If the reader is interested in the later phases of RDT&E planning, it is suggested that he examine some of the newer planning and control techniques currently used to manage various Navy projects. Such planning and control concepts as PERT, PERT/COST, milestone reporting, line-of-balance, and coordinated systems development are currently being used with considerable success in this field.

CHAPTER I

ORGANIZATION FOR RDT&E IN THE DEPARTMENT OF THE NAVY

Introduction

In order to understand the organization for Research, Development, Test and Evaluation in the Navy it is necessary to have some understanding of the bilinear system of management employed in the overall organization of the Department of the Navy. As developed over the years, this bilinear system embraces two distinct lines of control, both of which emanate from the Secretary of the Navy and serve as his principal command lines in the administration of the Navy.

The first of these lines is that of military command responsibility. Headed by the Chief of Naval Operations (CNO), this line progresses downward through the fleet commands, force commands, and combatant units. It is this side of the organization that is charged with the responsibility for military operations. The CNO is specifically concerned with training the existing combatant forces and developing the capabilities and combat readiness of these forces. In this capacity, the CNO is the principal assistant and advisor to the Secretary of the Navy on all military matters.

The other branch of the bilinear system is the support branch of the Navy. This branch is primarily concerned with providing the equipment, material, trained personnel, and services necessary to meet the requirements established by the military forces. Headed by the Secretary of the Navy, and administered by the various Assistant and Under Secretaries of the Navy, the support branch consists primarily of the technical bureaus and their associated field activities. In their capacity as supporting elements, the members of this branch are primarily concerned with the business management aspects of running the Navy, as opposed to military management of the operating forces.

Consumer-Producer Relationship

The bilinear structure of the Department of the Navy leads logically to an overall consumer-producer relationship between the two structural lines. With respect to hardware and weapons, the Chief of Naval Operations is the consumer; hence he is responsible for establishing requirements in terms of what is needed, when it is needed, and where it is needed.

In contrast, the bureaus and their associated field activities, which are under the direction of the Secretary of the Navy and his administrative assistants, may be looked upon as the producers of hardware and weapons, and are responsible for

the management of the affairs of the Department of the Navy in meeting these requirements. Consequently, the bureaus and offices are responsible for how the hardware requirements of the Chief of Naval Operations will be met.[1]

Coordination versus Control

Because of the duality which exists within the organizational structure of the Department of the Navy, the only direct line of authority between the military side and the support side of the organizational structure is through the Secretary of the Navy. However, because of the obvious bottle-neck that would occur if such a responsibility/authority relationship were followed rigidly, the Secretary of the Navy has assigned considerable liaison and coordinating authority to both sides of the structure.

In 1958, in conjunction with an administrative reorganization of the Department of the Navy, the Office of the Chief of Naval Operations (Development) was created within the Office of the Chief of Naval Operations. The prime functional responsibility of this organization consists of coordinating and

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[1]U. S. Department of Defense, Department of the Navy, Bureau of Ships Instruction 250-331-1, Research, Development, Test and Evaluation Programming, April, 1961, p. II-1. Cited hereafter as NAVSHIPS 250-331-1.

correlating the RDT&E requirements of the various warfare divisions of the Office of the Chief of Naval Operations. In some measure this office has assisted in the coordination and liaison between the military and support sides of the Navy by providing a focal point from which requirements can flow, and to which proposals to fill these requirements can be presented.

Organizational Relationships

Within the province of the RDT&E field, four major organizational relationships exist. However, in any discussion of organizational relationships it must be remembered that the Department is headed by the Secretary of the Navy, who exercises policy control over all Navy matters in accordance with instructions received from the Secretary of Defense and the President; and that the Chief of Naval Operations is the principal assistant and advisor to the Secretary of the Navy on all military matters. Within the purview of RDT&E, however, responsibility has been delegated to subordinate levels, and it is these subordinate organizational levels which are pertinent to the planning and control of the RDT&E effort in the Navy.

Assistant Secretary of the Navy for Research and Development

As the principal advisor to the Secretary of the Navy on RDT&E matters, the Assistant Secretary of the Navy for Research and Development bears general responsibility for policy, management,

and control of these matters within the Department of the Navy.[1] In this capacity he is responsible for the general management of the annual Navy RDT&E appropriation. He makes specific decisions on current and imminent programs and budgets. He sets policy for in-house laboratories and reviews the execution of this policy. He exercises immediate supervision over the Office of Naval Research, and he engages in the administrative, fiscal, and coordinative activities derived from the responsibilities listed above. However, it should be noted that determination of the operational requirements toward which the RDT&E effort should be directed are vested in the Chief of Naval Operations and his designated assistants.

In his role of policy making and overall management, the Assistant Secretary of the Navy for Research and Development chairs the Navy Research and Development Committee (composed of representatives from the Chief of Naval Operations, Chief of Naval Research, Commandant of the Marine Corps, and the technical bureaus), and acts in an advisory capacity to the various RDT&E study groups. He establishes annual RDT&E program guidance, interprets appropriate directives from the Office of the Secretary

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[1]U. S. Department of Defense, Department of the Navy, Office of the Secretary of the Navy Instruction 3900.7A, Research, Development, Test and Evaluation (RDT&E) Policies, March 1, 1960, p. 1. Cited hereafter as SECNAV Instruction 3900.7A.

of Defense, and issues policy and implementing instructions. He approves the consolidated RDT&E program, and also reviews and makes recommendations on various military construction items related to the RDT&E program. As necessary, he directs curtailment and/or redirection of RDT&E effort, and approves and forwards reprograming actions and emergency fund requests.

As the general manager of the Navy's RDT&E appropriation, he approves and forwards RDT&E budget and apportionment requests, bases on the approved RDT&E program, and approves initial allocations and subsequent changes in the level of funding for portions of the program.

The responsibilities of the Assistant Secretary of the Navy for Research and Development for in-house laboratories require him to maintain continuing contact with the laboratories through technical bureau representatives, laboratory directors, and senior scientists. His responsibilities for the Office of Naval Research require him to make management decisions on its funds, personnel and facilities.

Finally, as the highest Navy official bearing primary responsibility for RDT&E matters, the Assistant Secretary of the Navy for Research and Development must engage in high-level coordination activities. He serves as liaison with the other Assistant Secretaries of the Navy, other services and agencies,

and the congress. He also coordinates Navy activities in the RDT&E field with interagency scientific groups.

Deputy Chief of Naval Operations (Development)

The Deputy Chief of Naval Operations (Development) performs staff assistance duties for the Chief of Naval Operations and the Assistant Secretary of the Navy for Research and Development.[1] He also has responsibilities for integrating RDT&E planning and programing.

With respect to RDT&E planning, the Deputy Chief of Naval Operations (Development), DCNO(D), bears a general responsibility both to the Chief of Naval Operations and to the Assistant Secretary of the Navy for Research and Development for the issuance of plans and requirements for equipment, material, personnel, and supporting services. He develops and assigns standard definitions, project designation systems, and related formats and procedures for uniform planning and programing.[2]

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 5430.2B, Organization Manual for the Office of the Chief of Naval Operations, May, 1958. Cited hereafter as OPNAV Instruction 5430.2B.

[2]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 5430.20, Additional Duties for the Deputy Chief of Naval Operations (Development), December 29, 1961, p. 1. Cited hereafter as OPNAV Instruction 5430.20.

His staff prepares and issues Advanced Development Objectives. They review and issue General Operational Requirements, Specific Operational Requirements, Tentative Specific Operational Requirements, and Exploratory Development Requirements, prepared by the appropriate deputies within the Office of the Chief of Naval Operations.[1] They designate lead bureau assignments for a systems development. They approve proposed technical approaches and technical development plans as recommended by the appropriate Deputy Chief of Naval Operations.

The DCNO(D) has a primary responsibility for the coordination and integration of the RDT&E program to insure a total effort continuously responsive to long range objectives, immediate requirements, fiscal limitations and advancing technology. He chairs the Navy Research and Development Review Board, and makes recommendations on the consolidated RDT&E program to the Assistant Secretary of the Navy for Research and Development. These program project listings form the basis for budget and apportionment submissions. He reviews and forwards requests for emergency funds and reprograming requests to the Assistant Secretary of the Navy for Research and Development. His staff maintains, in visual display form, the current status of technical programs (including

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[1]Advanced Development Objectives and the various RDT&E requirements listed are explained in detail in Chapter II. However, it should be noted that the DCNO(D) is only responsible for preparing Advanced Development Objectives. Other RDT&E requirements are prepared by the cognizant DCNO's within the Office of the Chief of Naval Operations and mearly correlated and coordinated through the DCNO(D).

their fiscal status) as related to the approved development plans.

Generally, the DCNO(D) assists the Assistant Secretary of the Navy for Research and Development in the coordination and direction of the overall Navy RDT&E program, and represents the Assistant Secretary at all levels of management as directed. He insures that the RDT&E programs fully support the desired RDT&E objectives. His staff continuously reviews and evaluates the progress of all Navy applied RDT&E programs, and they develop recommendations for him to the Assistant Secretary for appropriate changes and future plans.[1]

Chief of Naval Research

The Chief of Naval Research is the principal advisor on research matters to the Assistant Secretary of the Navy for Research and Development. In a staff capacity to the Assistant Secretary, the Chief of Naval Research is responsible for planning, programing, and coordinating Navy research (basic research) and the research aspects of exploratory development. He serves as the advisor to the Assistant Secretary on basic research and on such other items as the Assistant Secretary may direct.

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations (Development), Report of the Ad Hoc Group on RDT&E Reporting Systems and Visual Displays, June, 1962, p. A6.

In his planning capacity, the Chief of Naval Research prepares and issues the Navy Research Requirements (explained in detail in Chapter II), and he coordinates with the Chief of Naval Operations to insure that procedures for uniform planning and programing are suitable for planning and reporting on research.

In the program area he insures that the Assistant Secretary of the Navy for Research and Development, the Chief of Naval Operations and the Commandant of the Marine Corps are kept fully informed on the status of the Naval Research program. In addition, he reviews and forwards emergency fund requests that pertain to basic research.

The comptroller staff of the Chief of Naval Research provides the budgeting, accounting and related services required by the Assistant Secretary of the Navy for Research and Development to manage and control the annual Navy RDT&E appropriation. They also provide those services required by the DCNO(D) to coordinate and integrate the RDT&E program.

Bureaus and Offices

The agencies which develop and procure the equipment and weapons required by the Chief of Naval Operations for the Naval operating forces are the six bureaus of the Department of the Navy, the Office of Naval Research, and the U. S. Marine Corps. In accordance with the bilinear structure of the Navy, the bureaus and offices are responsible to the Secretary of the Navy for the

prosecution of projects in support of the specific requirements of the Chief of Naval Operations and the Commandant of the Marine Corps.

The bureaus and offices perform a dual function; that is, they manage and conduct the research and development efforts, and they procure the hardware and weapons required by the operating forces. In these capacities they may act as contracting agents for the Navy (if the research, development or production is performed by industry or private institutions) or they may act as management agents (if the work is performed at laboratories or field activities under their cognizance).

Technical and fiscal management is peaked at the bureau level for each program, and the bureaus and offices perform detailed accounting of the funds allocated to them under the Navy's RDT&E appropriation. In keeping with the principle of decentralization of authority in the Navy, relations between the bureaus and offices and the laboratories and field activities are generally similar to those between the Chief of Naval Operations and the bureaus. The bureaus generally instruct the laboratories and field activities as to the <u>what</u>, <u>when</u> and <u>where</u> through project orders or problem assignments, but the <u>how</u> of accomplishing the work is left to the discretion of the field activity. In a few cases a bureau may delegate directly to the laboratory the detailed technical management of a particular

project. In such a case, the bureau retains overall management control and fiscal functions while the technical details of the program are directed by the personnel of the laboratory involved.

In their planning capacity, the bureaus and offices prepare long range plans in their areas of competency, accompanied with Proposed Technical Approaches and Technical Development Plans in response to the requirements promulgated by DCNO(D).[1]

In their respective areas, each bureau and office develops its portion of the RDT&E program based on guidance issued by the Assistant Secretary of the Navy for Research and Development, and the annual program objectives issued by the Chief of Naval Operations. In executing the respective programs, each bureau and office prepares project listings and initiates and prosecutes research and exploratory development programs in accordance with the general guidance furnished by the Office of the Chief of Naval Operations and the Office of Naval Research within the available resources. Management decisions relating to funds, personnel, and facilities pertaining to its laboratories and field activities are made at the bureau or office level, and emergency fund and reprograming requests are prepared, if necessary.

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[1]NAVSHIPS 250-331-1, p. A4.

Summary

In summary, direction and control of the Navy effort in RDT&E, as described thus far, is vested in four primary organizational levels. The principal duties and responsibilities of these four levels may be summarized as follows:

1. The Assistant Secretary of the Navy for Research and Development sets overall RDT&E policy and reviews and approves the consolidated RDT&E program and any changes thereto.

2. The Deputy Chief of Naval Operations (Development), as the direct representative of the Chief of Naval Operations in this matter, promulgates the Navy Development, Test and Evaluation plans, and monitors the subsequent effort. As staff to the Assistant Secretary of the Navy for Research and Development, he is the coordinator of the entire Navy RDT&E program.

3. The Chief of Naval Research plans and monitors the Navy's research program. He is the advisor to the Assistant Secretary of the Navy for Research and Development on research matters, and serves him and the Deputy Chief of Naval Operations (Development) as the fiscal manager of the RDT&E budget and appropriation.

4. The bureaus and offices are the executors of the RDT&E program and managers of the RDT&E resources and facilities.

CHAPTER II

DOCUMENTATION UTILIZED IN THE RDT&E PLANNING PROCESS

Introduction

In order to assist the reader in understanding the processes by which RDT&E is accomplished in the Navy, and to provide him with the clarity and continuity required for a conceptual understanding of the terminology employed, the documentation utilized in the planning process for the accomplishment of RDT&E in the Navy will be examined. Specific attention will be given to the development of requirements for new or revised systems and equipment, and to the processes whereby these requirements are met (within the capabilities of the Navy and industry).

Throughout this thesis, but throughout this chapter in particular, the reader should keep in mind the bilinear structure of the Department of the Navy. It is hoped that the relationships between the various bureaus and offices, discussed in Chapter I, has made the consumer-producer relationship which exists within the Navy sufficiently clear, for it is on this concept of duality that the overall planning processes for RDT&E in the Navy is based.

Before examining the planning process in detail, however, mention should be made of the general manner in which the consumer-producer relationship operates. As described in Chapter I, the various offices of the Chief of Naval Operations, under the military command structure headed by the Chief of Naval Operations, are

> responsible for planning, forecasting, and determining requirements of the Operating Forces of the Navy for equipment, material, personnel, and supporting services, and for coordinating and directing the efforts of the bureaus and offices of the Navy Department as may be necessary to effectuate availability and distribution of these requirements.[1]

In this capacity the various offices of the Chief of Naval Operations, which are responsible for generating the requirements for the various levels of RDT&E effort, may be considered as the consumers.

Conversely, the various technical bureaus and offices, under the administrative direction of the Assistant Secretary of the Navy for Research and Development, are responsible to respond to the RDT&E requirements generated by the CNO by fulfilling them within the capabilities of the sphere of technical knowledge available. Obviously in this capacity, the bureaus and offices are acting in the role of a producer.[2]

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[1]U. S. Department of Defense, Department of the Navy, The Department of the Navy, A Description of its Functional Organization, May, 1962, p. 15.

[2]Ibid., p. 10.

Within the naval establishment, research is broken down into two areas--basic and applied. Both stem from the overall objectives of the Navy Department; but, in line with the organizational duality that exists, each is administered separately. As such, basic research, which is intended to increase the store of basic scientific knowledge in those areas which might have some applicability to the Navy, falls under the purview of the support side of the Navy. That this is so is logical when it is realized that research designed to discover new concepts, techniques, and ideas as yet unknown can have no immediate military significance.

Conversely, the establishment of requirements for the various phases of development and applied research rightly falls within the purview of the command side of the Navy, for it is the application of existing knowledge in new and challenging ways that can provide the military with new systems and equipment to further the accomplishment of the Navy's mission.

Documentation

In any organization the size of the Navy, or for that matter in any major governmental or industrial organization, planning and controlling must be accomplished by specific and standardized documentation. The RDT&E organization within the Navy is no exception. Therefore, before examining the planning process employed within the Navy for planning and controlling the RDT&E effort, the documentation involved will be discussed. In

general, RDT&E documentation within the Navy takes on two forms--that of requirements generated within the various segments of the Navy designed to outline general or specific objectives of the RDT&E effort, and responses to these requirements whereby the objectives can be attained. To assist the reader, the seven major documents involved with the RDT&E planning and control process will be examined in detail. By this means it is hoped that future discussions of the function of the planning process can be more easily understood.

In keeping with the duality of the organizational structure, the majority of the requirements toward which the RDT&E effort is to be expended are generated by the military side of the Navy, whereas the majority of the responses to these requirements are generated by the supporting technical bureaus and offices. Table 1 indicates the major documentation required and the activity responsible for its preparation.

TABLE 1

MAJOR RDT&E DOCUMENTATION AND MAJOR NAVY ACTIVITIES RESPONSIBLE FOR ITS GENERATION

Document	Responsible Activity
Naval Research Requirements	Chief of Naval Research
Exploratory Development Requirements	Chief of Naval Operations
General Operational Requirements	Chief of Naval Operations
Tentative Specific Operational Requirements	Chief of Naval Operations
Specific Operational Requirements	Chief of Naval Operations
Proposed Technical Approaches	Technical Bureau
Advanced Development Objectives	Chief of Naval Operations
Technical Development Plans	Technical Bureau

Naval Research Requirements (NRR's)

The major area in which requirements are developed by the support side of the Navy is that of basic research. That this is so is quite logical; for basic research in the words of the Assistant Secretary of Defense for Research and Engineering, Mr. Harold Brown

> includes all effort directed toward increased information on natural phenomena and environment and efforts directed toward the solution of problems in the physical, behavioral and social sciences that have no clear direct military application. . . . It does not include efforts directed to prove the feasibility of solutions of problems of immediate military importance or time-oriented investigations and developments.[1]

Therefore, the function of basic research is placed within the support side of the Navy, and is specifically assigned to the Chief of Naval Research.

In accordance with directives from the Assistant Secretary of the Navy for Research and Development, the Chief of Naval Research is

> responsible to the Assistant Secretary of the Navy (Research and Development) for the conduct and coordination of Naval research and exploratory development in augmentation of and in conjunction with the programs of research, development, test and evaluation conducted by the bureaus and offices of the Navy Department.[2] (Italics added.)

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[1] U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 3900.8A, Planning Procedures for the Navy Research, Development, Test and Evaluation (RDT&E) Program, January 15, 1962, p. 2. Cited hereafter as OPNAV Instruction 3900.8A.

[2] SECNAV Instruction 3900.7A, p. 2.

Within the scope of responsibility outlined above, the prime responsibility of the Chief of Naval Research in conducting and coordinating the naval research effort is in the establishment of broad guidelines within which basic research will be carried out by the appropriate technical bureaus and offices. In fulfilling this responsibility, the Chief of Naval Research issues Naval Research Requirements (NRR's) to the interested bureaus and offices.[1]

In providing guidance concerning Naval Research Requirements, the Chief of Naval Research has designated eleven major areas within which the specific Naval Research Requirements lie (e.g., physical sciences, chemical sciences, electronic sciences, etc.). Each major area includes a general statement of the parameters of the scientific disciplines involved, a general explanation of the areas in which the Navy's interests appear to lie, and a statement of the overall objectives of the research desired within the designated areas.

Following the broad outlines of each major research area are listed the specific Naval Research Requirements; the accomplishment of which, it is hoped, will lead to a fulfillment

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Research Instruction 3910.2A, Naval Research Requirements (NRR), Promulgation of, March 30, 1959, p. 1.

of the stated objective. As an example, the major research area of mathematical sciences includes the following as its objective:

> The objectives of research in the Mathematical Sciences are to extend the boundaries of knowledge in pure and applied mathematics and related fields, and to devise mathematically based methods, techniques and tools which can be applied by and for the Navy to its advantage and furtherance of its mission.[1]

Within this major research area of mathematical sciences, specific Naval Research Requirements include such items as:

> Numerical Analysis, particularly with reference to methods appropriate to electronic computation. . . . Celestial Mechanics, theories of and methods for predicting with enduring accuracy the motions of objects outside the earth's atmosphere.[2]

With the following statement, the Chief of Naval Operations summarizes the place and purpose of Naval Research Requirements (NRR) within the overall planning framework of the Naval RDT&E effort:

> Naval Research Requirements (NRR) are statements in general terms of the need for investigations and studies in the physical and life sciences to provide information related to solution of specific practical problems and to obtain fuller knowledge or understanding of the subject under study.
>
> Naval Research Requirements are published by the Chief of Naval Research and constitute a directive to all developing agencies to plan for and initiate appropriate projects and tasks in their areas of competency.[3]

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[1] Ibid., p. 6.

[2] Ibid., p. 7.

[3] OPNAV Instruction 3900.8A, p. 3.

It should be noted that immediate practical benefits from this research are neither envisioned nor expected. At such times as breakthroughs occur in the basic store of scientific knowledge, additional requirements will be issued by the military side of the Navy to direct the application and utilization of this knowledge to specific areas of naval concern.

As might be expected, advanced planning of the effort to be expended for basic research cannot be precise. Therefore, funds for the accomplishment of the projects undertaken in response to Naval Research Requirements are controlled by the Chief of Naval Research and are allocated to the various bureaus and offices on a level-of-effort basis.

Exploratory Development Requirements (EDR's)

The first functional area in which the military side of the Navy becomes involved with the RDT&E effort is that of exploratory development, for it is in this area that the military application of the fruits of basic research can first be applied. In the words of Mr. Harold Brown, the Assistant Secretary of Defense for Research and Engineering,

> Exploratory Development includes all effort directed toward the solution of specific military problems, short of major development projects. This type of effort may vary from fairly fundamental applied research to quite sophisticated bread-board hardware, study, programming and planning efforts. It would thus include studies, investigations and minor development effort. The dominant characteristic of this

> category of effort is that it be pointed toward specific military problem areas with a view toward developing and evaluating the feasibility and practicability of proposed solutions and determining their parameters.[1]

Therefore, determination of the requirements toward which exploratory development efforts are directed is placed within the military side of the Navy, and responsibility for this determination is specifically assigned to the Chief of Naval Operations.

In order to assure a satisfactory degree of coordination within the military sphere for the development of these requirements, the Chief of Naval Operations has reassigned the responsibility for the collection, correlation, and dissemination of Exploratory Development Requirements to the Deputy Chief of Naval Operations (Development).[2]

Actual determination of the specific military problems toward which exploratory development effort should be directed is made by the various warfare divisions of the Office of the Chief of Naval Operations. This involves close liaison between these divisions and the respective technical bureaus and offices. In accordance with the scope of responsibility outlined above, the Deputy Chief of Naval Operations (Development) collects and

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[1] Ibid., p. 2.

[2] OPNAV Instruction 5430.2B, p. 18.

correlates the Exploratory Development Requirements submitted by the other divisions of the Office of the Chief of Naval Operations, and issues Exploratory Development Requirements (EDR's) to the interested bureaus and offices.[1]

The principal function of EDR's is to provide the support side of the Navy with an enumeration of the specific military problems foreseen by the Navy toward which exploratory development effort should be applied, and to act as an action document by which "developing agencies are directed to plan for and initiate appropriate projects and tasks in their areas of responsibility."[2]

As stated in the Bureau of Ships manual for Research and Development, Exploratory Development Requirements

> comprise a comprehensive catalogue for work to be initiated . . . by the bureaus and offices of the Navy on specific functions of direct importance to the Navy. . . . This work will include the correction of deficiencies to in-service equipment, and the development of new system components and techniques with emphasis on the advancement of capability for future generations of fleet systems. Projects which are established to demonstrate the results of feasibility studies of new techniques will be covered by exploratory development requirements.[3]

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 3910.3A, Exploratory Development Requirements, August 21, 1962, p. 1. Cited hereafter as OPNAV Instruction 3910.3A.

[2]Ibid.

[3]NAVSHIPS 250-331-1, p. IV-2.

In promulgating EDR's, the Deputy Chief of Naval Operations (Development) has designated eighteen major exploratory development areas within which the specific exploratory development requirements lie (e.g., target surveillance, navigation, communications, ships and submarines, etc.). Each major area includes a general statement of the need for research and development in the area, and provides sufficient direction such that the developing agency can determine the parameters within which it should operate.

Following the broad outlines of each major exploratory development area, specific EDR's are listed; the accomplishment of which, it is hoped will lead to a solution of a specific military problem.

To assist the reader in understanding the characteristics of the major exploratory development areas and EDR's, the major area of target surveillance will be examined. Within this area, the following general statement is included:

> Applied research and development are required to attain improved capabilities for target surveillance. Detection, location, classification and identification of all types of space, air, surface, and subsurface vehicles and targets are included in this area. . . . Applied research and development in this area should include the study, design . . . construction and test of new techniques and methods and experimental equipments which may be used in future target surveillance systems or which will improve present operating systems.[1]

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[1]OPNAV Instruction 3910.3A, p. 1.

Listed separately under this general statement of the need for research and development in the major area of target surveillance are twelve EDR's. Each EDR is sufficiently specific such that the responsible bureau or office can determine the requirements of the overall problem, yet sufficiently broad that the developing agency is not restricted in finding a solution to the requirement (except by the lack of basic scientific knowledge in the field). Examples of some of the EDR's encompassed within this major development area include:

> Radar Surveillance. . . . This EDR encompasses all aspects of the use of radar techniques for target surveillance; i.e., the improvement of detection, range, automatic detection, data rate, data handling, target handling capacity, range and bearing resolution, operation reliability and simplicity, etc.
>
> Sonobuoy--target surveillance. This EDR encompasses all aspects of underwater surveillance which employ sonar techniques that require an airborne radio link between the detection and display equipment.[1]

The Chief of Naval Operations has summarized the place and purpose of EDR's within the overall framework of Navy RDT&E requirements in the following words:

> Exploratory Development Requirements (EDR) are statements of the need for investigations and studies to demonstrate new techniques in naval functional areas, or the feasibility of a system, sub-system or component. This comprises the effort directed toward improvement and expansion of naval capabilities through the application of advances in technology.
>
> Exploratory Development Requirements are published by CNO . . . and constitute a directive to all developing agencies to plan for and initiate appropriate projects and tasks in their areas of competency.[2]

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[1] Ibid., p. 1-3.

[2] OPNAV Instruction 3900.8A, p. 3.

General Operational Requirements

In progressing from the need for development of basic research and scientific knowledge toward the actual solution of an operational problem facing the Navy, the military side of the Navy must furnish the support side with desired general operational goals toward which existing knowledge or hardware can be applied. The responsibility for the development of the requirements designed to meet these goals rests with the military side of the Navy and is vested in the Chief of Naval Operations. The means by which the Chief of Naval Operations advises the various technical bureaus and offices of these goals is through the promulgation of General Operational Requirements.[1]

As with exploratory development requirements, the responsibility for the collection, correlation, and dissemination of General Operational Requirements (GOR's) has been reassigned by the Chief of Naval Operations to the Deputy Chief of Naval Operations (Development).[2] However, actual determination of the general operational problems toward which the Navy's RDT&E effort should be applied is made by the various warfare divisions within the Office of the Chief of Naval Operations.

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 3910.9, General Operational Requirements (GOR); Procedures and Format, March 20, 1962, p. 1. Cited hereafter as OPNAV Instruction 3910.9.

[2]OPNAV Instruction 5430.2B, p. 21.

In promulgating GOR's, the Deputy Chief of Naval Operations (Development) has designated four major operational areas within which the operational requirements lie. These are (1) strike warfare, (2) anti-submarine warfare, (3) command support, and (4) operational support. Within each of the four major areas additional breakdowns are made so that the individual GOR's can be properly definitized. Examples of this further subdivision within the major area of strike warfare include such subdivisions as airborne attack, submarine attack, airborne anti-air, and surface anti-air.[1] Each of the other major operational areas is similarly subdivided into appropriate categories. Individual GOR's are then placed within the appropriate subdivision.

The purpose of the individual GOR is to broadly define a requirement for a needed capability within one of the subdivisions of a major warfare or support area. However, examples of individual GOR's cannot be provided here because of the classified nature of such information. When promulgated, the GOR's form the basis for the majority of the development effort of the technical bureaus and offices; and it is to these, and the more definitive requirements explained later, that the primary responses of the support side of the Navy are directed.

The Chief of Naval Operations has summarized the purpose and place of GOR's within the overall framework of the Navy's

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[1]OPNAV Instruction 3910.9, Enclosure (2).

RDT&E effort in the following words:

> General Operational Requirements (GOR) will broadly define needed capabilities for a major warfare or support area.
>
> The purpose of each GOR will be to provide general guidance to the developing agencies for (a) the preparation of proposed solutions . . . for providing needed capabilities and for assisting in defining system concepts and (b) the planning and formulation of Exploratory Development and Naval Research Programs.[1]

Tentative Specific Operational Requirements (TSOR's)

In keeping with the consumer-producer relationship between the Office of the Chief of Naval Operations and the various technical bureaus and offices, the Chief of Naval Operations awaits responses from the bureaus and offices to the various requirements levied by him. As such, under the normal process, the Chief of Naval Operations waits for the bureaus and offices to propose solutions to operational requirements before initiating development of any new system or equipment to increase the operational capability of the Navy.

However, to provide an alternate means by which the military side of the organization can initiate the development of a new system or equipment, the Chief of Naval Operations has made provision for the generation of Tentative Specific Operational Requirements (TSOR's).[2]

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[1]OPNAV Instruction 3900.8A, p. 2.

[2]Ibid.

The tentative specific operational requirement is an optional document, infrequently used, which "enables the Chief of Naval Operations to initiate specific development without awaiting a GOR stimulated Proposed Technical Approach."[1] When used, the developing agency to which it is directed will commence development of the proposed system or hardware along the lines outlined by the TSOR. However, as the bureaus and offices are usually in a much better position to know the feasibility of the various technical approaches that can be taken, the TSOR which outlines the approach to be taken is seldom utilized. None the less, it does serve the purpose of allowing those on the military side of the house to feel that they can initiate a development if they feel that their technical approach is sufficiently feasible.

Specific Operational Requirements (SOR's)

In outlining the documentation utilized in describing the requirements levied on the support side of the Navy, we have progressed from the point of basic research to that of developing general operational requirements. However, as yet, no new systems have been developed nor has any new equipment been designed. Therefore, as a logical step in the RDT&E planning process, the final requirement levied by the Chief of Naval Operations on the

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[1] Ibid.

technical bureaus and offices is that of outlining requirements to accomplish specific operational objectives.

The reader will soon realize that the development of requirements to accomplish specific operational objectives cannot be done satisfactorily until the various technical alternatives available to accomplish these objectives are known. This, of course, is the case, and no consideration is given to proposing specific requirements until after the technical bureaus and offices have responded to prior requirements by providing the Chief of Naval Operations with proposed technical approaches. It is only after consideration of these proposals, and a determination of which alternative offers the best compromise between capability, time, and cost that the Deputy Chief of Naval Operations (Development) issues SOR's.[1]

The purpose of SOR's is to direct a technical bureau or office to proceed with the necessary planning so that a specific system or concept can be translated from a proposed technical approach into a plan for the development of the system or concept. As stated by the Chief of Naval Operations:

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 3910.6, Specific Operational Requirements (SOR); Procedures and Format for, January 15, 1962, pp. 1-3. Cited hereafter as OPNAV Instruction 3910.6.

> A Specific Operational Requirement will state a need for a capability, will outline a system or major component for achieving it, and will state the reasons for the requirement. An SOR will constitute a directive to a Lead Bureau for the preparation of a Technical Development Plan (TDP) to accomplish the objective stated.[1]

Although actual examples of SOR's cannot be given because of the security classification of the material involved, it should be noted that the SOR's are the most detailed of all the requirements levied on the technical bureaus and offices. Included are such categories of information as the threat against which the new system or component will be applied, the current capabilities of the Navy in this field, the current capabilities under development among the three services, the desired capabilities to be achieved with the new system or component, the compatibility of the new system or component with others existing in the environment in which it will be used, and the personnel and training aspects which will be required by utilization of the new system or component. In addition, SOR's must include the reasons for the choice of the particular alternative chosen and the priority under which the technical development plan for the new system should be developed.[2]

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[1] Ibid.

[2] Ibid., Encl. (1).

Proposed Technical Approaches (PTA's)

In discussing the documentation utilized in the initiating and planning phases of the RDT&E effort within the Navy, emphasis has been given thus far to the mechanism for developing the various requirements of the operational side of the Navy. Only brief mention has been made of the support functions of responding with technical information, although the reader undoubtedly has realized that the development of requirements is but half, and frequently even less than half, of the overall RDT&E planning picture. Although requirements and goals have to be established before the RDT&E resources can be effectively applied, the technical bureaus and offices must respond to these requirements before any effective solutions can be reached.

In the chain of applied research and development between exploratory development and completed systems, the first response from the technical bureaus and offices to the requirements established by the Chief of Naval Operations is in the form of Proposed Technical Approaches (PTA's).[1] The purpose of PTA's, as stated by the Chief of Naval Operations, is as follows:

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 3910.8, Proposed Technical Approaches for New Systems and Components, March 23, 1962, p. 1. Cited hereafter as OPNAV Instruction 3910.8.

> Proposed Technical Approaches (PTA) will recommend solutions for a system or component concept stated or implied in a General Operational Requirement or a Tentative Specific Operational Requirement. Proposed Technical Approaches will provide a major source of the information required by the Secretary of Defense regarding possible trade-offs between cost and performance and between lead time and costs for use in long range planning for the Fleet Development Program. For this purpose, as many PTA's as may be appropriate will be initiated by the technical bureaus and offices for each system or component concept.[1]

As described above, PTA's form the basis for the solution to the general operational problems which the various warfare divisions of the Office of the Chief of Naval Operations foresee in the future. The Chief of Naval Operations has also defined a PTA as a document prepared by a technical bureau or office that "will comprise a suggested solution for a tactical or strategic problem that is contained, either explicitly or implicitly, in a GOR or TSOR."[2] Consequently, PTA's are the prime means by which the Chief of Naval Operations is advised of possible solutions to established requirements and possible alternatives which can be employed to accomplish the same overall objective. If these technical proposals prove to be operationally feasible, and are acceptable to the Secretary of Defense, they then form the basis from which SOR's for a system or component can be

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[1] Ibid., p. 2.

[2] OPNAV Instruction 3900.8A, p. 3.

developed, or from which advanced development objectives can be prepared and issued.[1]

Advanced Development Objectives (ADO's)

On occasion the Chief of Naval Operations may wish to initiate development on systems or components which have not yet proved their military or financial worth. As a means of accomplishing this, and as an adjunct to the use of Specific Operational Requirements (which normally express the final determination of the proposed solution to a specific military problem), the Chief of Naval Operations has made provisions for the issuance of Advanced Development Objectives (ADO's).[2]

As with the use of SOR's, the reader will realize that the development of requirements for the initiation of technical development on experimental systems or components cannot be done efficiently until the office levying the requirement has available to it various PTA's by which the objective can be accomplished. Therefore, as with SOR's, ADO's are not initiated until the technical bureaus and offices have submitted various alternative solutions in the form of PTA's.

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[1] Ibid.

[2] U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 3910.7, Advanced Development Objectives (ADO); Procedures for Preparation of, January 15, 1962. Cited hereafter as OPNAV Instruction 3910.7.

As described thus far, ADO's appear to be quite similar to SOR's. However, the Chief of Naval Operations has differentiated the two requirements in the following manner:

> Advanced Development Objectives will be preferred to Specific Operational Requirements when an experimental system is not yet assured as to military usefulness, technical feasibility and financial acceptability.[1]

In defining the function and use of ADO's, the Chief of Naval Operations describes Advanced Development Objectives in the following way:

> An Advanced Development Objective (ADO) comprises a definite statement of the concept of, the functions to be performed by, and the desired operational capability to be attained by an experimental system or component.
>
> Advanced Development Objectives will document the need for (a) a feasibility study for a new system or component, (b) a feasibility study augmented by limited experiments, or (c) field experiments with an advanced system or component in order to determine that the concept is valid, and that a significant improvement in naval warfare capability will be realized.[2]

As described above, it can be seen that ADO's are primarily designed to permit the Chief of Naval Operations to document the need for studies and/or experiments in advanced systems not yet approved for production by the Office of the Secretary of Defense.

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[1] Ibid.

[2] Ibid.

As with all requirements promulgated by the Chief of Naval Operations, the issuance of an Advanced Development Objective constitutes a "directive to a Lead Bureau for the preparation of a Technical Development Plan . . . to accomplish the objective stated."[1]

Although actual examples of ADO's cannot be given because of the security classification of the material involved, it should be noted that ADO's are as equally detailed in their format as are SOR's. In fact, both requirements utilize identical formats so that the developing agencies can have sufficient information from which to properly develop satisfactory technical plans.[2]

Technical Development Plans (TDP's)

The final link in the planning cycle for the naval RDT&E effort is comprised of a document issued by the technical bureaus and offices called a Technical Development Plan.[3] The function of a Technical Development Plan is to provide a technical plan for the fulfillment of the requirements specified in an ADO or an SOR. However, in addition to providing the Chief of Naval

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[1]OPNAV Instruction 3900.8A, p. 2.

[2]OPNAV Instruction 3910.7, p. 1.

[3]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 3910.4A, Technical Development Plan, November 11, 1962. Cited hereafter as OPNAV Instruction 3910.4A.

Operations with a suitable plan for the actual accomplishment of specific military or experimental requirements, the TDP provides Navy management on both sides of the bilinear structure with a valuable management tool. As stated by the Chief of Naval Operations:

> The purpose of each TDP is to provide an up-to-date management control and reporting document for each project being carried out under an ADO or SOR. It constitutes the primary information source for decision-making at the management levels of the Lead Bureau . . . and above.[1]

In combining the two prime functions listed above, the TDP becomes the firm proposal, compiled by the technical bureaus and offices, for the accomplishment of a specific requirement. In this capacity it reflects the technical means by which the requirement is to be met, the time schedules and milestones through which the development will progress, the means to be utilized to manage and evaluate the project and its progress, and the funding requirements needed to fulfill the plan.

Specifically, a TDP must include, in addition to the technical details explaining how the requirement is to be met, detailed information on such areas as:

1. The management plan to be employed; including such items as the managerial organization to be employed throughout

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[1]OPNAV Instruction 3900.8A, p. 4.

the development, the adaptability and utilization of PERT/COST management techniques, the specific managerial techniques to be utilized, and specific milestone data.

2. The financial plan to be employed; including a time phased breakdown of estimated costs per each fiscal year for the development, including development, test, evaluation, production, delivery, installation and operational use.

3. Sub-system characteristics for each of the major components of the project under development; including the availability of on-the-shelf items, and the degree of risk involved in obtaining the necessary sub-systems.

4. The test and evaluation plan to be utilized; including specific emphasis on the assignment of responsibilities for the conduct of the test and evaluation, and recommended tests and evaluations which should be conducted in order to determine the operational suitability of the system or component under service operating conditions.

5. The production, delivery, and installation plan to be utilized; including specific estimates of development lead time, planned annual production, installation requirements, and development and production cost estimates.[1]

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[1]OPNAV Instruction 3910.3A, pp. 1-14.

As such, it can be readily seen that the TDP is the prime instrument utilized by the bureaus and offices to plan for, and be prepared to produce, the systems and components required by the Navy under its RDT&E effort. Obviously many man hours are required to prepare a TDP properly, but in the long run it serves as the actual road map for the expenditure of the major portion of the overall Navy RDT&E effort.[1]

Summary

In summary, the documentation required for the accomplishment of effective planning for the RDT&E effort within the Navy consists of two general types. The first of these types is concerned with the determination of what is needed, when it is needed, and where it is needed. Included within this sphere are NRR's, EDR's, GOR's, TSOR's, and ADO's. With the exception of NRR's, all of these documents are the responsibility of the command side of the Navy structure, and are generated within the Office of the Chief of Naval Operations. Progressing from the

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[1]For those who might be interested in the full content of a Technical Development Plan, OPNAV Instruction 3910.4A provides detailed information on what must be included in the final plan. This instruction provides for some 14 different categories of information that must be included in the plan, and spells out in detail the requirements for the development of a plan which is properly correlated with other development efforts and is acceptable to the Chief of Naval Operations and the Secretary of Defense.

more general to the more specific, each document provides guidance to the developing agencies in the form of requirements toward which the RDT&E resources of the developing agencies should be applied. Concomitant with the guidance provided, each document directs the developing agencies to initiate planning and/or projects within the areas of their competency.

The second general type of RDT&E documentation is concerned with how the established requirements can be most effectively fulfilled. Included within this type are Proposed Technical Approaches and Technical Development Plans. In line with the producer-consumer relationships previously described, these documents are the responsibility of the support side of the Navy structure, and are generated within the various technical bureaus and offices. Again, progressing from the more general to the more specific, PTA's are prepared in response to the more general requirements established while TDP's are specific plans designed to explain just how the developing agency plans to accomplish the desired objective.

CHAPTER III

FUNCTIONAL OPERATION OF THE RDT&E PLANNING PROCESS

Introduction

The planning process utilized within the Navy today in its attempt to maximize the utilization of its RDT&E effort and resources is an outgrowth of several different systems employed by the individual technical bureaus and offices prior to the reorganization of the Office of the Chief of Naval Operations in 1958, combined with the newer requirements generated by the recent strengthening of the Office of the Secreatry of Defense.[1]

Table 2 presents a pictorial flow of the overall planning process utilized in the RDT&E planning process, and is properly annotated with the appropriate terminology currently employed.[2] It is hoped that this table will assist the reader in interpreting the planning process and terminology discussed, while at the same time serve as a reminder that the relationships between the

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[1]OPNAV Instruction 5430.2B, p. 24.

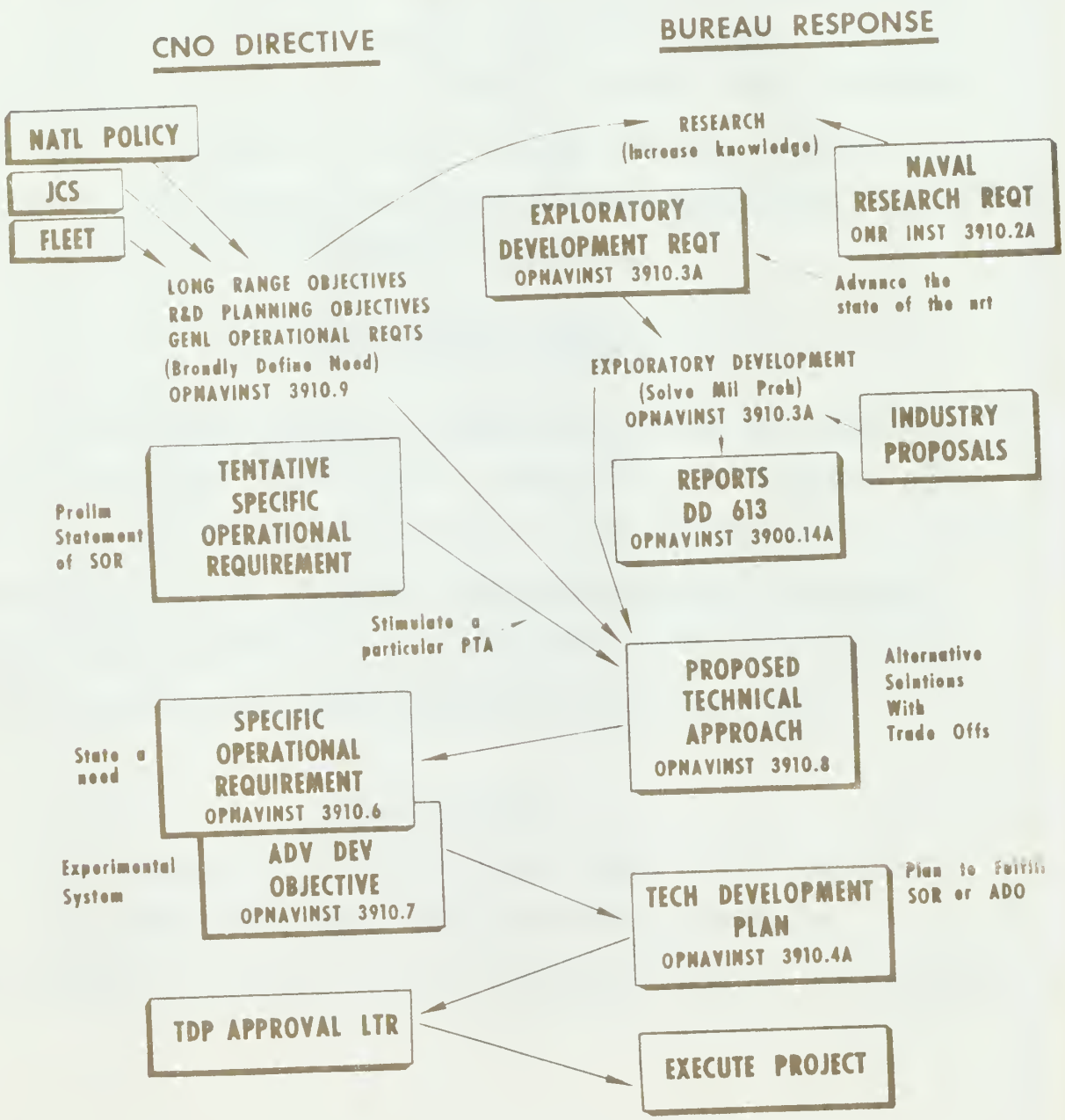
[2]OPNAV Instruction 3900.8A, p. 6.

Table 2

ASSIGN RESPONSIBILITY
SECNAV INST 3900.7A
5430.20
5430.21

DOCUMENTATION OF REQUIREMENTS FOR DEVELOPMENT EFFORT

OPNAV INST 3900.8A



producer and consumer sides of the Navy organization are neither sharply defined nor easily followed.

Although a detailed examination of the planning process will be restricted to that portion contained wholly within the Navy, it should be realized that the initial objectives of the Navy's research and development program are strongly influenced by information and directives received from the Joint Chiefs of Staff, and are responsive to the overall national objectives of the United States through the media of the Joint Chiefs of Staff and the Office of the Secretary of Defense.

The RDT&E Planning Process

The overall planning process utilized by the Navy in managing its RDT&E effort will be examined in two phases. The first phase includes an examination of the functional responsibilities for planning. The second phase will examine the functional aspects of the development of plans in relation to the execution of the RDT&E program within the Navy.

Responsibility

In accordance with directives issued by the Chief of Naval Operations, the Deputy Chief of Naval Operations (Development) is charged with the responsibility for coordination

of the overall RDT&E effort within the Department of the Navy.[1] In addition, the Deputy Chief of Naval Operations (Development) is charged with the responsibility for coordinating the Department of the Navy's annual RDT&E program (which forms the basis for the budgetary requests presented to the Secretary of the Navy, and is correlated within the RDT&E program package required by the Secretary of Defense).[2] As stated by the Chief of Naval Operations:

> The Navy Department Annual RDT&E Program is comprised of the aggregate of the individual projects planned in support of SOR's, ADO's, GOR's, EDR's, NRR's, the Marine Corps requirements, and the necessary Range and Management Support projects for that fiscal year. The DCNO(D) is responsible for coordinating the Navy Department RDT&E Program. . . . DCNO(D) is also responsible for assuring that those Navy Department RDT&E projects's packages other than package 6 are adequately coordinated with the appropriate OPNAV and Marine Corps sponsors.[3]

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[1]U. S. Department of Defense, Department of the Navy, Office of the Chief of Naval Operations Instruction 5430.21, Research, Development, Test & Evaluation (RDT&E) Program Responsibilities, January 11, 1962, p. 1.

[2]OPNAV Instruction 3900.8A, p. 4.

[3]Ibid.

Therefore, although not specifically stated in official documents, the Deputy Chief of Naval Operations (Development) must exercise overall coordination and control of the RDT&E planning process in order to be able to fulfill his other assigned responsibilities. The means by which the Deputy Chief of Naval Operations exercises control over the RDT&E planning process is through the use of the documentary tools described in Chapter II.

Execution

As described in Chapter II, Naval Research Requirements and Exploratory Development Requirements are continuing requirements of a long range nature. They are prepared by the Office of the Chief of Naval Research and the Office of the Chief of Naval Operations, and serve as the long range objectives toward which the RDT&E effort in the Navy should be aimed. As such, they form the initial basis for the planning of this effort. In addition, Naval Research Requirements and Exploratory Development Requirements serve as directives to the technical bureaus and offices so that detailed planning can be accomplished to fulfill the stated objectives. At least annually the developing agencies are required to report their accomplishments in attempting to arrive at solutions to these objectives.

It should be noted that both of the general long range planning documents are unclassified. As such, the long range planning objectives can be made available readily to industry,

and it is at this level that industry proposals for the solution of these requirements can be submitted.

The next phase of the planning process is concerned with the application of the research effort toward the solution of broad and long range military objectives. The documentation utilized by the Deputy Chief of Naval Operations (Development) to coordinate this phase of planning consists of General Operational Requirements and Tentative Specific Operational Requirements. These documents, combined with the output responses of the developing agencies to Exploratory Development Requirements, outline the long range military requirements as seen by the Chief of Naval Operations, and form the plan from which the developing agencies can direct the RDT&E effort in their respective areas.

In turn, the technical bureaus and offices respond to this long range military RDT&E plan by generating Proposed Technical Approaches. As described in Chapter II, Proposed Technical Approaches provide the Chief of Naval Operations with several different technical approaches, or plans, by which the developing agency feels the objectives described by the long range RDT&E plan can be met.

The final phase of the RDT&E planning process is concerned with the application of the RDT&E effort toward the solution of

specific military objectives. The documentation utilized by the Deputy Chief of Naval Operations (Development) to coordinate this phase of planning consists of Specific Operational Requirements and Advanced Development Objectives. These documents outline the short range military requirements, and form the plan from which the developing agencies can direct the RDT&E effort in their respective areas of competency.

In turn, the technical bureaus and offices respond to this short range military RDT&E plan by generating Technical Development Plans. As described in Chapter II, Technical Development Plans are specific proposals, or plans, by which the developing agency intends to accomplish the specific objectives outlined in the short range RDT&E plan.

Technical Development Plans are received by the Deputy Chief of Naval Operations (Development) and correlated with the various warfare divisions of the Office of the Chief of Naval Operations, the Navy Comptroller, and the Assistant Secretary of the Navy for Research and Development to assure their military and financial acceptability. If approved throughout, the Deputy Chief of Naval Operations prepares an approval letter for the Technical Development Plan in question, authorizing the developing agency to proceed with the project as outlined.

Summary

The planning process utilized by the Navy in its control of the RDT&E effort is twofold. In keeping with the duality that exists in the organizational structure, responsibility for the generation of plans in terms of what is to be accomplished, when it is to be accomplished, and where it is to be accomplished is vested in the military command side of the structure. These plans take the form of Exploratory Development Requirements, General Operational Requirements, Tentative Specific Operational Requirements, Specific Operational Requirements, and Advanced Development Objectives. Each is expressed in terms of military requirements and serves as a means of directing the RDT&E effort of the support side of the organization.

In response to these requirements plans, the responsibility for the generation of technical plans in terms of how the requirements can be accomplished is vested in the support side of the structure. These plans take the form of Proposed Technical Approaches and Technical Development Plans. Each is expressed in terms of how the military requirements can be accomplished and serves as a means of informing the military side of the structure how the support side intends to apply its RDT&E effort.

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